Archives of Gynecology and Obstetrics
https://doi.org/10.1007/s00404-024-07806-6

GYNECOLOGIC ONCOLOGY

# Determining the relationship between gynecologic cancer awareness and health literacy among women of reproductive age: a descriptive study

**Fatma Nur Duman**[1] · **Ayse Ozdemir**[2] · **Zehra Golbasi**[1]

Received: 12 June 2024 / Accepted: 20 October 2024
© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2024

## Abstract

**Purpose** To determine the relationship between gynecologic cancer awareness and health literacy among women of reproductive age.

**Methods** This study was conducted in a descriptive design and involved 510 women. Data collection utilized the "Personal Information Form", "Gynecologic Cancer Awareness Scale (GCAS)" and "Health Literacy Scale (HLS)", gathered. Pearson correlation and linear regression analyses, independent samples t-test, one-way analysis of variance and post hoc analyses were employed for data analysis. Effect sizes were calculated using eta-squared ($\eta^2$) coefficients.

**Results** The mean total score of women on the GCAS was $154.42 \pm 18.27$, while the mean total score on the HLS was $57.07 \pm 7.86$. Significant differences were observed in women's GCAS total scores concerning age, perceived income status, and history of gynecological examination, whereas significant differences were noted in HLS total scores concerning age, educational status, marital status, and perceived income status. A weak positive correlation was detected betwixt women's GCAS and HLS total scores. It was determined that 20.8% of the total variation in gynecologic cancer awareness level was explained by health literacy.

**Conclusion** Women exhibit an above-average level of awareness regarding gynecologic cancers. Health literacy level contributes to an increase in gynecologic cancer awareness.

**Keywords** Gynecologic cancer · Awareness · Health literacy · Women · Reproductive age · Nursing

**What does this study add to the clinical work**

This study demonstrated that higher levels of health literacy among women are associated with increased awareness of gynecological cancers. Based on this finding, it is suggested that enhancing women's health literacy could lead to greater sensitivity towards gynecological cancer risk factors, as well as early diagnosis and screening methods, thereby facilitating the early detection of these cancers.

## Background

Women face reproductive health-related risks both during their reproductive years and later in life [1]. Reproductive health issues not only affect the individual woman but also have broader implications for her family and the community, necessitating focused attention [2]. Gynecologic cancers are significant public health concerns for women, contributing to substantial morbidity and mortality [3]. Types and prevalence of gynecologic cancers vary across countries depending on their level of development and socioeconomic conditions [4]. According to the Global Cancer Incidence (GLOBOCAN) 2022 data, the most common gynecologic cancers worldwide are cervical,

✉ Fatma Nur Duman
fatmanurduman8@gmail.com

[1] Faculty of Health Sciences, Department of Obstetrics and Gynecology Nursing, Lokman Hekim University, Ankara, Turkey

[2] Ankara Sincan Training and Research Hospital, Ankara, Turkey

Published online: 04 November 2024

endometrial, and ovarian cancers, whereas in Turkey, the order is endometrial, ovarian, and cervical cancers [5].

Identifying region-specific risk factors for prevalent gynecologic cancers and promoting early detection are essential for prevention, timely and effective treatment, and improving survival outcomes [2]. Avoidance of risky health behaviors and environmental risk factors, along with the adoption of healthy lifestyle practices among women, can significantly reduce cancer incidence, facilitate early diagnosis, and lower mortality rates [4]. Moreover, increasing awareness and knowledge about gynecologic cancers among women can contribute to mortality reduction through earlier detection. It is widely recognized that the most effective approach to raising awareness of gynecologic cancers is through education focused on risk reduction, early diagnosis, and treatment, thereby enhancing women's health literacy [6].

Health literacy, which plays a crucial role in improving both women's health and the overall health of the community, refers to individuals' ability to acquire, comprehend, evaluate, and apply health-related information to make informed decisions about their health. Adopting lifelong learning policies is essential for enhancing health literacy [7]. Improving women's health literacy within a society has the potential to elevate the general health status of the entire population [8]. Health literacy levels are shaped by a range of factors, including individual characteristics, demographic attributes, as well as cultural and psychosocial influences [9]. Insufficient health literacy has been linked to difficulties in understanding recommended treatments, missed opportunities for early cancer detection, underutilization of preventive health services, increased unnecessary hospital visits, and, consequently, higher healthcare costs. These negative outcomes have been associated with elevated morbidity and mortality rates [10]. Furthermore, a study in the literature found that limited health literacy was correlated with greater pain intensity, depressive symptoms, and pain catastrophizing in women suffering from chronic pelvic pain [11].

In a study, it was reported that a written informational brochure on gynecologic cancer symptoms increased symptom awareness and reduced barriers to seeking medical assistance [12]. Consequently, enhancing health literacy and knowledge regarding gynecologic cancers is believed to increase women's awareness and promote positive health behaviors. While research on gynecologic cancer awareness has predominantly concentrated on cervical cancer [13–15], only a limited number of studies have explored the relationship between gynecologic cancer awareness and health literacy [16–19]. The findings of these studies generally suggest that improvements in health literacy have a positive impact on gynecologic cancer awareness. Given that levels of health literacy and gynecologic cancer awareness may vary across different social segments and socio-economic strata, the aim of our study is to examine the relationship between gynecologic cancer awareness and health literacy among women of reproductive age. The research questions are as follows:

- What are the levels of gynecologic cancer awareness and health literacy among women?
- Do levels of gynecologic cancer awareness and health literacy among women vary significantly according to their socio-demographic characteristics?
- Is there a relationship between women's levels of gynecologic cancer awareness and health literacy?

## Methods

### Design

The research is descriptive. The reporting of the study follows the guidelines set forth in the “Strengthening the Reporting of Observational Studies in Epidemiology” (STROBE) statement. Data collection took place betwixt February 15 and December 31, 2023, at a private hospital located in Ankara.

### Sample

The study population comprised women of reproductive age who visited the specified hospital clinics for any reason between February and December 2023. The sample size was calculated based on the study by Uslu Şahan et al. (2023), taking into account an effect size of 0.25, a margin of error of 0.05, and a statistical power of 95%. According to this analysis, the target was to recruit 305 participants [16]. However, a total of 510 women were enrolled within the specified timeframe. Following the completion of the study, a post hoc analysis was performed, revealing a power of 99%, with a margin of error of 0.05 and an effect size of 0.24. The statistical analyses were conducted using the G*Power 3.1.9.2 software package.

Inclusion Criteria:

- Age between 20 and 49,
- Absence of gynecologic diseases,
- Absence of psychiatric disorders.

Exclusion Criteria:

- Failure to meet the inclusion criteria,
- History of gynecologic cancer,
- Current pregnancy.

## Measurement

Data collection was conducted using a "Personal Information Form", "Gynecologic Cancer Awareness Scale" and "Health Literacy Scale".

Personal Information Form

Developed by the researchers, this form consists of 10 questions querying the sociodemographic characteristics [age, educational status, employment status, marital status, perceived income status] and gynecological features [history of gynecological examination, frequency of gynecological check-ups, level of knowledge about gynecologic cancers, etc.] thought to influence women's awareness of gynecologic cancer.

"Gynecologic Cancer Awareness Scale (GCAS)"

Developed by Alp Dal and Ertem (2017) for women aged 20–65, this scale comprises 41 items and aims to assess women's awareness of gynecologic cancers. Each item is rated on a five-point Likert scale. The scale consists of four subscales: "routine check-up and perception of serious illness", "awareness of cancer risks", "awareness of cancer prevention", and "awareness of early diagnosis and information". The lowest possible score on the scale is 41, while the highest is 205. As scores increase, awareness also increases. The Cronbach's Alpha coefficient for the scale was found to be 0.94 [4]. In this study, the calculated Cronbach's Alpha coefficient is 0.94.

"Health Literacy Scale (HLS)"

The Turkish validity and reliability study of the scale, originally developed in Japan, was conducted by Türkoğlu and Kılıç (2021). Each item is rated on a five-point Likert scale, with the 5th items reverse-coded. The scale comprises three subscales: "Functional Health Literacy (FHL)", "Interactive FHL", and "Critical FHL". The lowest possible score on the scale is 14, while the highest is 70, and higher scores indicate higher health literacy levels. The original Cronbach's Alpha coefficient of the scale was found to be 0.81 [20]. In this study, the calculated Cronbach's Alpha coefficient is 0.93.

## Data collection and analysis

The data were collected women aged 20–49 years after providing them with information about the study. The collected data were then evaluated using the IBM SPSS 22.0 statistical program. Descriptive statistics, such as frequency, percentage, mean and standard deviation analyses, were utilized to determine descriptive characteristics. Histogram graphs, normality tests, Kurtosis, and Skewness values (Table 2) were analyzed to determine whether the research variables were normally distributed. In the related literature, the results of kurtosis and skewness values of the variables between + 1.5 and −1.5 [21], + 2.0 and −2.0 [22] are accepted as normal distribution. As a result of the normality test, it was determined that the variables fit the normal distribution ($p > 0.05$) and parametric tests were used in the analysis. Pearson correlation and linear regression analyses were conducted to determine relationships betwixt scales. Differences in scale scores according to women's sociodemographic characteristics were detected using independent samples t-test, one-way analysis of variance and post hoc analyses. Effect sizes were calculated using eta-squared ($\eta^2$) coefficients.

## Results

The distribution of women participating in our study according to descriptive characteristics is presented in Table 1. It was found that 60.4% of women were in the age range of 20–25 years, with a mean age of 27.210 ± 8.212 (min = 20; max = 49). Furthermore, 75.3% of women had a university education, 61.4% were not employed, 67.6% were single, and 75.7% perceived their income status as moderate. Additionally, 54.9% of women reported never having had a gynecological examination, while among those who had undergone such examinations, 42.6% reported a frequency of 1–3 years. Regarding knowledge about gynecologic cancers, 50.6% of women reported knowing the risk factors, 53.1% reported knowing screening tests, and 50.0% reported knowing the symptoms of gynecologic cancers (Table 1).

The mean score for women's total GCAS was calculated as 154.42 ± 18.27 (min = 48; max = 203), with the subscale scores as follows: "awareness of routine check-ups and seriousness of gynecologic cancers" with a mean score of 86.74 ± 12.21 (min = 23; max = 110), "awareness of gynecologic cancer risks" with a mean score of 28.72 ± 5.30 (min = 12; max = 45), "awareness of protection from gynecologic cancers" with a mean score of 21.96 ± 3.57 (min = 8; max = 30), and "awareness of early diagnosis and information on gynecologic cancers" with a mean score of 16.99 ± 2.61 (min = 4; max = 20). The mean score for women's total HLS was determined as 57.07 ± 7.86 (min = 31; max = 70), with the subscale scores as follows: Functional HL with a mean score of 19.25 ± 4.24 (min = 5; max = 25), Interactive HL with a mean score of 20.83 ± 3.35 (min = 5; max = 25), and Critical HL with a mean score of 16.98 ± 2.74 (min = 4; max = 20) (Table 2).

The GCAS total and the subscale scores of women vary significantly by age ($p < 0.05$). The subscale scores for

**Table 1** Distribution of women according to descriptive characteristics

| Descriptive characteristics | n | % |
|---|---|---|
| Age (mean: 27.21 SD: 8.21) | | |
| 20–25 | 308 | 60.4 |
| 26–30 | 72 | 14.1 |
| 31–35 | 36 | 7.1 |
| 36–40 | 40 | 7.8 |
| 41–45 | 54 | 10.6 |
| Educational status | | |
| Elementary school and below | 31 | 6.1 |
| High school | 95 | 18.6 |
| University | 384 | 75.3 |
| Employment status | | |
| Yes | 197 | 38.6 |
| No | 313 | 61.4 |
| Marital status | | |
| Married | 165 | 32.4 |
| Single | 345 | 67.6 |
| Perceived ıncome status | | |
| Low | 71 | 13.9 |
| Moderate | 386 | 75.7 |
| High | 53 | 10.4 |
| History of gynecological examination | | |
| Yes | 230 | 45.1 |
| No | 280 | 54.9 |
| Frequency of gynecological examination (n = 230) | | |
| Once a year or more often | 75 | 32.6 |
| Every 1–3 years | 98 | 42.6 |
| Every 4–5 years | 24 | 10.4 |
| Once every 5 years or longe | 33 | 14.3 |
| Awareness of gynecologic cancer risk factor | | |
| Yes | 258 | 50.6 |
| No | 252 | 49.4 |
| Awareness of gynecologic cancer symptoms | | |
| Yes | 255 | 50.0 |
| No | 255 | 50.0 |
| Awareness of gynecologic cancer screening tests | | |
| Yes | 271 | 53.1 |
| No | 239 | 46.9 |

"routine check-up and serious illness perception in gynecologic cancers" and "awareness of gynecologic cancer risks" show significant differences according to marital status ($p < 0.05$). Significant differences are observed in GCAS total scores and the subscale score for "routine check-up and serious illness perception in gynecologic cancers" based on perceived income level ($p < 0.05$). Additionally, significant differences are found in GCAS total scores and subscale scores for "routine check-up and serious illness perception in gynecologic cancers," "awareness of gynecologic cancer risks," and "awareness of gynecologic cancer prevention" according to the status of having had a gynecological examination ($p < 0.05$) (Table 3).

Women's scores on the HLS total and sub-dimensions show significant differences based on age and perceived income level ($p < 0.05$). Significant differences were observed in the total HLS score and the functional HL sub-dimension score based on educational background ($p < 0.05$). Additionally, women's scores on the HLS total and sub-dimensions vary significantly according to their marital status ($p < 0.05$) (Table 4).

Table 5 presents the correlation analysis examining the relationships between the scores obtained from GCAS and HLS among the participating women in our study. There was a positive and weak correlation betwixt the mean total score of GCAS and the mean total score of HLS, a positive and very weak correlation betwixt the mean total score of GCAS and the mean score of the functional HL subdimension, a positive and weak correlation betwixt the mean total score of GCAS and the mean score of the Interactive HL subdimension, and a positive and weak correlation betwixt the mean total score of GCAS and the mean score of the critical HL subdimension ($p < 0.01$).

Additionally, a positive and weak correlation was found betwixt the mean score of the "awareness of routine check-ups and seriousness of gynecologic cancers" subdimension and the mean total score of HLS, a positive and very weak correlation betwixt the mean score of this subdimension and the mean score of the functional HL subdimension, a positive and weak correlation betwixt the mean score of this subdimension and the mean score of the Interactive HL subdimension, and a positive and weak correlation betwixt the mean score of this subdimension and the mean score of the critical HL subdimension ($p < 0.01$).

Moreover, a positive and very weak correlation was observed betwixt the mean score of the "awareness of gynecologic cancer risks" subdimension and the mean total score of HLS, a positive and very weak correlation betwixt the mean score of this subdimension and the mean score of the interactive HL subdimension, and a positive and very weak correlation betwixt the mean score of this subdimension and the mean score of the critical HL subdimension ($p < 0.01$).

There was a positive and weak correlation betwixt the mean score of the "awareness of protection from gynecologic cancers" subdimension and the mean total score of HLS, a positive and very weak correlation betwixt the mean score of this subdimension and the mean score of the functional HL subdimension, a positive and weak correlation

**Table 2** Mean scores of GCAS, HLS total and subscale scores, Cronbach's Alpha reliability coefficients, Kurtosis, skewness values

| | Mean | SD | Min | Maks | Alpha | Kurtosis | Skewness |
|---|---|---|---|---|---|---|---|
| GCAS total score | 154.42 | 18.27 | 48.00 | 203.00 | 0.941 | 0.745 | −0.299 |
| Awareness of routine check-ups and severity of gynecologic cancers | 86.74 | 12.21 | 23.00 | 110.00 | 0.934 | 0.412 | −0.600 |
| Awareness of gynecologic cancer risks | 28.72 | 5.30 | 12.00 | 45.00 | 0.939 | 0.500 | 0.252 |
| Awareness of protection from gynecologic cancers | 21.96 | 3.57 | 8.00 | 30.00 | 0.924 | 0.718 | −0.298 |
| Awareness of early diagnosis and ınformation on gynecologic cancers | 16.99 | 2.61 | 4.00 | 20.00 | 0.918 | 0.354 | −1.156 |
| HLS total score | 57.07 | 7.86 | 31.00 | 70.00 | 0.936 | −0.127 | −0.245 |
| Functional HL | 19.25 | 4.24 | 5.00 | 25.00 | 0.909 | 0.308 | −0.644 |
| Interactive HL | 20.83 | 3.35 | 5.00 | 25.00 | 0.924 | 1.024 | −0.883 |
| Critical HL | 16.98 | 2.74 | 4.00 | 20.00 | 0.928 | 0.963 | −1.286 |

betwixt the mean score of this subdimension and the mean score of the interactive HL subdimension, and a positive and very weak correlation betwixt the mean score of this subdimension and the mean score of the critical HL subdimension ($p < 0.01$) (Table 5).

Furthermore, a positive and weak correlation was found betwixt the mean score of the "awareness of early diagnosis and knowledge in gynecologic cancers" subdimension and the mean total score of HLS, a positive and very weak correlation betwixt the mean score of this subdimension and the mean score of the functional HL subdimension, a positive and weak correlation betwixt the mean score of this subdimension and the mean score of the interactive HL subdimension, and a positive and weak correlation betwixt the mean score of this subdimension and the mean score of the critical HL subdimension ($p < 0.01$) (Table 5).

The regression analysis conducted to determine the cause–effect relationship betwixt health literacy and awareness of gynecological cancers was found to be significant ($F = 135.081$; $p = 0.000 < 0.05$). The total variation in the level of awareness of gynecological cancers is explained by health literacy at a rate of 20.8% ($R^2 = 0.208$). Health literacy level increases the level of awareness of gynecological cancers ($\beta = 0.458$) (Table 6).

Regression analysis conducted to determine the cause–effect relationship betwixt functional health literacy, ınteractive health literacy, critical health literacy and awareness of gynecological cancers was found to be significant ($F = 51.942$; $p = 0.000 < 0.05$). The total variation in the level of awareness of gynecological cancers is explained by functional health literacy, interactive health literacy, and critical health literacy at a rate of 23.1% ($R^2 = 0.231$). Levels of functional health literacy ($\beta = 0.107$), ınteractive health literacy ($\beta = 0.295$), and critical health literacy ($\beta = 0.183$) increase the level of awareness of gynecological cancers (Table 6).

## Discussion

This study aimed to determine the relationship between gynecologic cancer awareness and health literacy among women aged 20–49 of reproductive age. The mean score of the GCAS obtained by women in the study was found to be 154.42. Considering that the lowest and highest possible scores that can be obtained from the scale are 41 and 205, the results indicate that women's awareness of gynecologic cancer is above the moderate level. Similar to our findings, the studies conducted by Uslu Şahan et al. (2023), Toptaş Acar et al. (2022), and Başaran and Duru (2024) reported mean GCAS scores of 159.4, 149.1, and 144.4, respectively [16, 19, 23]. Despite the fact that the level of gynecologic cancer awareness among the women participating in the study is above the moderate level, it is considered insufficient. This may be due to the lack of open communication on gynecologic issues among participants due to their sociodemographic characteristics and societal and cultural factors, as well as the inadequacy of health services related to this issue and the negative impact of fear and taboos associated with cancer on awareness levels.

The study found significant differences in women's GCAS total scores according to age, with women aged 36–40 and 41–49 having the highest levels of awareness compared to other age groups. Additionally, it was determined that women with a perceived high income level had significantly higher levels of gynecologic cancer awareness compared to those with a perceived moderate income level. There are many studies in the literature indicating an association betwixt awareness of gynecologic cancers and sociodemographic factors such as age and income status [24–26]. Khatuja and Rai (2019) emphasized in their study that with increasing age, the risk of gynecologic cancer and thus awareness levels also increase [27]. Similarly, in our study, the high levels of awareness among women aged 36–40 and 41–49 may be attributed to the increased risk of cancer at these ages and women's concerns regarding this issue. Additionally, the higher awareness levels among women with a

**Table 3** Distribution of GCAS total and subscale score means according to descriptive characteristics

| Descriptive characteristics | n | GCAS total | Awareness of routine checkups and serious disease perception in gynecologic cancers | Awareness of gynecologic cancer risks | Awareness of gynecologic cancer prevention | Awareness of early diagnosis and ınformation about gynecologic cancers |
|---|---|---|---|---|---|---|
| Age | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| 20–25 | 308 | 153.909 ± 17.921 | 85.607 ± 12.197 | 29.357 ± 5.004 | 21.828 ± 3.526 | 17.117 ± 2.393 |
| 26–30 | 72 | 158.250 ± 17.983 | 90.236 ± 10.569 | 28.681 ± 5.490 | 22.375 ± 3.609 | 16.958 ± 3.160 |
| 31–35 | 36 | 146.000 ± 23.526 | 82.472 ± 15.823 | 26.972 ± 5.824 | 20.528 ± 4.266 | 16.028 ± 3.282 |
| 36–40 | 40 | 156.900 ± 19.023 | 89.625 ± 11.916 | 27.125 ± 6.256 | 22.525 ± 3.651 | 17.625 ± 2.072 |
| 41–49 | 54 | 156.037 ± 14.296 | 89.259 ± 10.077 | 27.556 ± 5.076 | 22.722 ± 2.923 | 16.500 ± 2.786 |
| F = | | 3.102 | 4.491 | 3.723 | 2.698 | 2.488 |
| p = | | **0.015** | **0.001** | **0.005** | **0.030** | **0.043** |
| Post hoc = | | 1 > 3, 2 > 3, 4 > 3, 5 > 3 (p < 0.05) | 2 > 1, 4 > 1, 5 > 1, 2 > 3, 4 > 3, 5 > 3 (p < 0.05) | 1 > 3, 1 > 4, 1 > 5 (p < 0.05) | 1 > 3, 2 > 3, 4 > 3, 5 > 3 (p < 0.05) | 1 > 3, 4 > 3, 4 > 5 (p < 0.05) |
| η2 = | | 0.024 | 0.034 | 0.029 | 0.021 | 0.019 |
| Educational status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Elementary school and below | 31 | 154.419 ± 19.349 | 88.452 ± 13.805 | 27.355 ± 6.998 | 22.065 ± 3.151 | 16.548 ± 2.791 |
| High school | 95 | 153.716 ± 17.700 | 86.653 ± 12.074 | 28.221 ± 5.278 | 22.168 ± 2.967 | 16.674 ± 2.562 |
| University | 384 | 154.599 ± 18.367 | 86.625 ± 12.132 | 28.964 ± 5.142 | 21.904 ± 3.740 | 17.107 ± 2.615 |
| F = | | 0.089 | 0.323 | 1.858 | 0.222 | 1.519 |
| p = | | 0.915 | 0.724 | 0.157 | 0.801 | 0.220 |
| Employment status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Yes | 197 | 155.508 ± 20.468 | 87.883 ± 13.215 | 28.645 ± 5.680 | 21.939 ± 3.920 | 17.041 ± 2.889 |
| No | 313 | 153.741 ± 16.742 | 86.022 ± 11.497 | 28.780 ± 5.061 | 21.978 ± 3.338 | 16.962 ± 2.437 |
| t = | | 1.063 | 1.679 | − 0.279 | − 0.119 | 0.331 |
| p = | | 0.310 | 0.094 | 0.780 | 0.909 | 0.741 |
| Marital status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Married | 165 | 155.346 ± 19.640 | 88.546 ± 12.410 | 27.830 ± 5.720 | 22.164 ± 3.681 | 16.806 ± 2.917 |
| Single | 345 | 153.983 ± 17.593 | 85.878 ± 12.037 | 29.157 ± 5.045 | 21.867 ± 3.517 | 17.081 ± 2.462 |
| t = | | 0.788 | 2.318 | − 2.658 | 0.879 | − 1.110 |
| p = | | 0.431 | **0.021** | **0.008** | 0.380 | 0.267 |
| η2 = | | | 0.010 | 0.014 | | |
| Perceived ıncome status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Low | 71 | 154.169 ± 15.577 | 86.732 ± 10.799 | 27.930 ± 5.434 | 22.732 ± 2.635 | 16.775 ± 2.244 |
| Moderate | 386 | 153.648 ± 18.736 | 86.065 ± 12.352 | 28.850 ± 5.227 | 21.780 ± 3.660 | 16.953 ± 2.723 |
| High | 53 | 160.415 ± 17.364 | 91.679 ± 12.027 | 28.906 ± 5.685 | 22.264 ± 3.889 | 17.566 ± 2.240 |
| F = | | 3.232 | 5.004 | 0.936 | 2.358 | 1.564 |
| p = | | **0.040** | **0.007** | 0.393 | 0.096 | 0.210 |
| Post hoc = | | 3 > 2 (p < 0.05) | 3 > 1, 3 > 2 (p < 0.05) | | | |
| η2 = | | 0.013 | 0.019 | | | |
| History of gynecological examination | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Yes | 230 | 156.717 ± 18.309 | 89.004 ± 12.429 | 28.065 ± 5.365 | 22.465 ± 3.442 | 17.183 ± 2.614 |
| No | 280 | 152.539 ± 18.058 | 84.882 ± 11.727 | 29.271 ± 5.199 | 21.550 ± 3.627 | 16.836 ± 2.617 |
| t = | | 2.584 | 3.845 | − 2.570 | 2.901 | 1.490 |
| p = | | **0.010** | **0.000** | **0.010** | **0.004** | 0.137 |
| η2 = | | 0.013 | 0.028 | 0.013 | 0.016 | |

P value in bold indicates a statistically significant difference. Significance level was set at $p < 0.05$

**Table 4** Distribution of HLS total and subdimension scores by descriptive characteristics

| Descriptive characteristics | n | HLS total | Functional HL | Interactive HL | Critical HL |
|---|---|---|---|---|---|
| Age | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| 20–25 | 308 | 57.73 ± 8.09 | 19.51 ± 4.19 | 21.01 ± 3.40 | 17.21 ± 2.70 |
| 26–30 | 72 | 58.47 ± 7.60 | 20.06 ± 3.86 | 21.27 ± 2.89 | 17.12 ± 2.57 |
| 31–35 | 36 | 54.80 ± 8.15 | 19.50 ± 3.41 | 19.38 ± 3.90 | 15.91 ± 3.04 |
| 36–40 | 40 | 56.85 ± 6.20 | 18.32 ± 4.73 | 21.27 ± 2.75 | 17.25 ± 2.12 |
| 41–49 | 54 | 53.13 ± 6.37 | 17.22 ± 4.58 | 19.88 ± 3.34 | 16.01 ± 3.09 |
| F = | | 5.444 | 4.685 | 3.512 | 3.775 |
| p = | | **0.000** | **0.001** | **0.008** | **0.005** |
| Post hoc = | | 1 > 3, 2 > 3, 1 > 5, 2 > 5, 4 > 5 (p < 0.05) | 2 > 4, 1 > 5, 2 > 5, 3 > 5 (p < 0.05) | 1 > 3, 2 > 3, 4 > 3, 1 > 5, 2 > 5, 4 > 5 (p < 0.05) | 1 > 3, 2 > 3, 4 > 3, 1 > 5, 2 > 5, 4 > 5 (p < 0.05) |
| η2 = | | 0.041 | 0.036 | 0.027 | 0.029 |
| Educational status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Elementary school and below | 31 | 53.58 ± 7.50 | 17.00 ± 6.00 | 20.00 ± 3.25 | 16.58 ± 2.80 |
| High school | 95 | 57.17 ± 7.83 | 19.32 ± 4.02 | 20.81 ± 3.68 | 17.04 ± 2.76 |
| University | 384 | 57.33 ± 7.85 | 19.41 ± 4.08 | 20.90 ± 3.27 | 17.00 ± 2.74 |
| F = | | 3.299 | 4.744 | 1.057 | 0.363 |
| p = | | **0.038** | **0.009** | 0.348 | 0.695 |
| Post hoc = | | 2 > 1, 3 > 1 (p < 0.05) | 2 > 1, 3 > 1 (p < 0.05) | | |
| η2 = | | 0.013 | 0.018 | | |
| Employment status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Yes | 197 | 56.61 ± 7.92 | 18.72 ± 4.55 | 20.93 ± 3.29 | 16.95 ± 2.83 |
| No | 313 | 57.36 ± 7.83 | 19.58 ± 4.01 | 20.77 ± 3.39 | 17.00 ± 2.69 |
| t = | | −1.048 | −1.242 | 0.527 | −0.195 |
| p = | | 0.295 | 0.051 | 0.598 | 0.845 |
| Marital status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Married | 165 | 55.28 ± 7.67 | 18.53 ± 4.49 | 20.34 ± 3.46 | 16.40 ± 3.03 |
| Single | 345 | 57.93 ± 7.82 | 19.60 ± 4.08 | 21.07 ± 3.27 | 17.26 ± 2.55 |
| t = | | −3.594 | −2.671 | −2.291 | −3.320 |
| p = | | **0.000** | **0.008** | **0.022** | **0.001** |
| η2 = | | 0.025 | 0.014 | 0.010 | η2 = 0.021 |
| Perceived ıncome status | | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Low | 71 | 58.47 ± 7.48 | 19.28 ± 4.96 | 21.50 ± 3.14 | 17.69 ± 2.32 |
| Moderate | 386 | 56.43 ± 7.67 | 19.01 ± 4.08 | 20.58 ± 3.28 | 16.82 ± 2.64 |
| High | 53 | 59.88 ± 8.97 | 20.98 ± 4.00 | 21.73 ± 3.85 | 17.17 ± 3.72 |
| F = | | 5.926 | 5.092 | 4.445 | 3.108 |
| p = | | **0.003** | **0.006** | **0.012** | **0.046** |
| Post hoc = | | 1 > 2, 3 > 2 (p < 0.05) | 3 > 1, 3 > 2 (p < 0.05) | 1 > 2, 3 > 2 (p < 0.05) | 1 > 2 (p < 0.05) |
| η2 = | | 0.023 | 0.020 | 0.017 | η2 = 0.012 |

P value in bold indicates a statistically significant difference. Significance level was set at p < 0.05.

perceived high income may be due to the increased income that households with higher socioeconomic status allocate to healthcare services, thereby positively influencing awareness levels.

The research findings revealed that women who had previously undergone gynecological examinations had significantly higher levels of awareness. Similarly, other studies in the literature have reported that women who have undergone gynecological examinations are more conscious [28–30]. Awareness of cancer symptoms is an important determinant for early diagnosis and screening [31]. Therefore, it is believed that community-based education on gynecologic cancer awareness will increase awareness on this issue.

In this study, the mean total score of the HLS scale obtained by women was found to be 57.07. Considering that the minimum score that can be obtained from the entire scale is 14 and the maximum score is 70, it can be said that the health literacy level of the women participating in our study

**Table 5** Correlation analysis between GCAS, HLS and subdimension mean scores

| | | HLS total | Functional HL | Interactive HL | Critical HL |
|---|---|---|---|---|---|
| GCAS total | r | 0.458 | 0.215 | 0.457 | 0.422 |
| | p | **0.000*** | **0.000*** | **0.000*** | **0.000*** |
| Awareness of routine screening and serious disease perception in gynecological cancers | r | 0.441 | 0.224 | 0.431 | 0.392 |
| | p | **0.000*** | **0.000*** | **0.000*** | **0.000*** |
| Awareness of risk factors in gynecological cancers | r | 0.189 | 0.041 | 0.225 | 0.203 |
| | p | **0.000*** | 0.361 | **0.000*** | **0.000*** |
| Awareness of prevention in gynecological cancers | r | 0.282 | 0.159 | 0.259 | 0.247 |
| | p | **0.000*** | **0.000*** | **0.000*** | **0.000*** |
| Awareness of early detection and knowledge in gynecological cancers | r | 0.373 | 0.158 | 0.371 | 0.372 |
| | p | **0.000*** | **0.000*** | **0.000*** | **0.000*** |

*$p < 0.01$; Pearson correlation analysis

**Table 6** The effect of health literacy on awareness of gynecological cancers

| Independent variable | Unstandardized coefficients | | Standardized coefficients | t | p | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | B | SE | β | | | Lower | Upper |
| Constant* | 93.666 | 5.277 | | 17.750 | 0.000 | 83.299 | 104.033 |
| HLS Total Score | 1.065 | 0.092 | 0.458 | 11.622 | **0.000** | 0.885 | 1.244 |
| Independent variable | Unstandardized coefficients | | Standardized coefficients | t | p | 95% Confidence Interval | |
| | B | SE | β | | | Lower | Upper |
| Constant** | 91.299 | 5.248 | | 17.395 | 0.000 | 80.988 | 101.610 |
| Functional HL | 0.462 | 0.173 | 0.107 | 2.677 | **0.008** | 0.123 | 0.801 |
| Interactive HL | 1.607 | 0.319 | 0.295 | 5.034 | **0.000** | 0.980 | 2.235 |
| Critical HL | 1.221 | 0.385 | 0.183 | 3.173 | **0.002** | 0.465 | 1.977 |

*Dependent Variable = GCAS Total Score, $R = 0.458$; $R^2 = 0.208$; $F = 135.081$; $p = 0.000$; *Durbin–Watson Value* = 1.840

**Dependent Variable = GCAS Total Score, $R = 0.485$; $R^2 = 0.231$; $F = 51.942$; $p = 0.000$; *Durbin–Watson Value = 1.868*

is above average. Although different measurement tools assessing health literacy were used in the literature, similar to our study, it has been reported that the health literacy level of women is above average [16, 32]. Generally, in the study, it was found that the health literacy level varied according to age, being significantly lower in the higher age group, those with a middle school or lower education level, married individuals, and those with a perceived middle income level. Similarly, in the study conducted by Uslu Şahan et al. (2023), it was found that the health literacy level was lower in the higher age group and among those with primary and middle school education, while the health literacy levels of married individuals and those with a higher income level were higher [16]. This difference could be attributed to the different measurement tools used. In line with the results of our research, it is believed that increasing women's educational levels will contribute to the increase in socioeconomic status, thereby improving access to healthcare services and potentially enhancing health literacy levels.

The research findings revealed a positive and weak correlation betwixt gynecological cancer awareness and health literacy levels among women. This indicates that as the level of health literacy increases, so does the level of gynecological cancer awareness. Additionally, it was found that 20.8% of the total variation in gynecological cancer awareness level was explained by health literacy, while 23.1% was explained by functional HL, interactive HL, and critical HL. This suggests that health literacy levels contribute to increasing gynecological cancer awareness levels. Consistent with our research findings, a study conducted by Uslu Şahan et al. (2023) also reported a positive relationship betwixt gynecological cancer awareness and health literacy levels [16]. Other studies have reported that health literacy positively affects knowledge and attitudes towards cancer awareness, leading to the development of preventive health behaviors, although it may not influence participation in screening programs [32–34]. The differences in study results may be attributed to variations in the measurement tools used,

participants' sociodemographic characteristics, and cultural differences.

There are several limitations to our study. The research was conducted at a hospital located in Ankara. Therefore, the research findings are limited to the center where the study was conducted and cannot be generalized to the broader population. It is important to conduct studies with larger sample sizes to enhance the generalizability of the results. The research provides information about the current status of the participants. Additionally, the data collection tools used rely on self-reporting by women, so the responses provided may be biased.

## Conclusion

Our research findings provide important insights into the relationship between women's health literacy levels and their awareness of gynecologic cancer. The results indicate that as women's health literacy levels increase, their awareness of gynecologic cancers also rises. Based on these findings, it is recommended to develop educational programs aimed at increasing gynecologic cancer awareness. Such programs would facilitate more effective communication between healthcare professionals and women, with particular emphasis on evaluating and improving health literacy among all women, especially those from lower socioeconomic backgrounds. Additionally, it is advised to plan healthcare services that aim to enhance health literacy, thereby improving knowledge and awareness of gynecologic cancers.

**Author contributions** All authors contributed to the study conception and design. Data analysis, manuscript writing were performed by Fatma Nur Duman, data collection were performed by Ayşe Ozdemir and protocol development, manuscript editing were performed by Zehra Golbasi. The first draft of the manuscript was written by Fatma Nur Duman and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

**Funding** This research was supported within the scope of TÜBİTAK 2209-A University Students Research Projects Support Program.

**Data availability** The data set is available from the corresponding author on reasonable request.

## Declarations

**Conflict of interests** The authors have no relevant financial or non-financial interests to disclose.

**Ethics approval** This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Lokman Hekim University (Decision No: 2023/15, Code No: 2023013) and institutional permission was access from the hospital where the research was conducted.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

## References

1. Şenol DK, Polat F, Doğan M (2020) Gynecological cancer awareness: reproductive age and postmenopausal women. Turkish J Family Med Primary Care 15(1):56–62
2. Atlas B, Güneri SE (2022) Awareness of women on Gynecological cancers and factors affecting awareness. J Health Sci Faculty İzmir Katip Çelebi Univ 7(1):77–85
3. Gözüyeşil E, Düzgün AA, Filiz TAŞ (2020) Evaluation of Gynecological cancer awareness of women applying to a family health center. Turkish J Family Med Primary Care 14(2):177–185
4. Dal Alp N, Ertem G (2017) Development of the Gynecological cancer awareness scale. J Human Soc Stud 6(5):2351–2367
5. Global Cancer Observatory (GLOBOCAN) 2022. Cancer factsheets. Available at: https://gco.iarc.fr/today/en/fact-sheets-cancers Accessed 23 Feb 2024.
6. Teskereci G, Öncel S, Arslan ÜÖ (2020) Evaluation of women in vocational training courses according to risk factors and early warning signs for gynecological cancers. J Contin Med Educ 29(4):229–238
7. Rudd RE, Anderson JE, Oppenheimer S, Nath C (2023) Health literacy: an update of medical and public health literature. In Rev Adult Learn Lit 7(1):175–204
8. Gönenç İM (2015) Health literacy for women's health. In: Yıldırım F, Keser A (eds) Health Literacy. Ankara University Press, Ankara, pp 61–74
9. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, Brand H (2012) Health literacy and public health: a systematic review and integration of definitions and models. BMC Public Health 12(1):1–13
10. Aktaş HA (2018) measurement tool for evaluating health and education; health literacy. J Health Sci Educ 1(1):12–16
11. Bennis S, Pham YN, Tseng I, Malisch B, Joyce CJ, Fitzgerald CM (2023) Health literacy in women with chronic pelvic pain. Arch Gynecol Obstet 308(3):919–926
12. Boxell EM, Smith SG, Morris M, Kummer S, Rowlands G, Waller J, Simon AE (2012) Increasing awareness of gynecological cancer symptoms and reducing barriers to medical help seeking: does health literacy play a role? J Health Commun 17(3):265–279
13. Aghaee A, Nasirian M, Pirzadeh A (2020) Health literacy related to cervical cancer among women referring to health centers of Yazd Iran. J Midwifery Reproduc Health 8(4):1–15
14. Flores BE, Acton G, Arevalo-Flechas L, Gill S, Mackert M (2019) Health literacy and cervical cancer screening among Mexican-American women. Health Lit Res Pract 3(1):1–8
15. Gözüyeşil E, Düzgün AA, Aslan KSÜ (2019) Evaluation of women's attitudes towards prevention and early diagnosis of cervical cancer. J Contin Med Educ 28(4):229–238
16. Uslu-Sahan F, Mert-Karadas M, Yıldız T, Koc G (2023) Effect of health literacy on the awareness of Gynecological cancer among women in Turkey. Indian J Gynecol Oncol 21(1):15
17. Coşkun S (2023) Effect of health responsibility and health literacy on gynecological cancer awareness of university working women. Turkish J Public Health 21(2):209–222
18. Köse S, Karakurt P (2023) A study on the effect of health literacy on the increase of awareness of gynecological cancers. Lokman Hekim Med Hist Folk Med J 13(1):196–206
19. Başaran F, Duru P (2024) Shining a light on women's health: the relationship between gynecological cancer awareness and health literacy. Arch Health Sci Res 11(1):42–48

20. Türkoğlu N, Kılıç D (2021) Turkish adaptation of the health literacy scale: a validity and reliability study. J Anatolian Nursing Health Sci 24(1):25–33
21. Tabachnick BG, Fidell LS (2013) Using multivariate statistics, 6th edn. Pearson, Boston
22. George D, Mallery M (2010) SPSS for windows step by step: a simple guide and reference. Pearson, Boston
23. Toptaş Acar B, Gerçek Öter E, Şanli Çolakoğlu H (2022) Awareness of gynaecological cancer and factors affecting in women: a cross-sectional study. J Obstet Gynaecol 42(7):3193–3198
24. Kim HW, Lee YJ, Lee EJ (2019) Effects of cervical cancer prevention education in middle-school girls in Korea: a mixed-method study. Heliyon 5(6):01826
25. Lin W, Wang Y, Liu Z, Chen B, Yuan S, Wu B, Gong L (2019) Awareness and attitude towards human papillomavirus and its vaccine among females with and without daughter (s) who participated in cervical cancer screening in Shenzhen China. Trop Med Int Health 24(9):1054–1063
26. Öztürk R, Bakir S, Kazankaya F, Paker S, Ertem G (2021) Awareness about gynecologic cancers and related factors among healthy women: a cross-sectional study. Soc Work Public Health 36(7–8):847–856
27. Khatuja R, Rai S (2019) Endometrial carcinoma: epidemiology and risk factors. In: Mehta S, Singla A (eds) Preventive Oncology for the Gynecologist. Springer Singapore, Singapore, pp 3–12
28. Atwa AME, Hassan HE, Ahmed SI (2019) The impact of a hospital-based awareness program on the knowledge of patients about breast cancer and cancer cervix. Int J Stud Nursing 4(1):20
29. Erenoglu R, Bayraktar E (2020) Awareness levels of married women aged 20–60 years about gynaecological cancer and the affecting factors. Int J Caring Sci 13(1):457–469
30. Teskereci G, Arslan ÜÖ, Öncel S (2022) The awareness levels of women for gynecologic cancer in Turkey: a cross-sectional study. Int J Gynecol Obstet 156:539–545
31. Narayana G, Suchitra MJ, Sunanda G, Ramaiah JD, Kumar BP, Veerabhadrappa KV (2017) Knowledge, attitude, and practice toward cervical cancer among women attending obstetrics and gynecology department: a cross-sectional, hospital-based survey in South India. Indian J Cancer 54(2):481
32. Koohpayeh SA, Estebsari F, Lashani F, Homayouni A, Nasiri M (2021) Relationship between health literacy and knowledge, attitude, and performance regarding cancer warning signs. Iran J Nurs Midwifery Res 26(1):399–405
33. Son YJ, Kim SH, Kim GY, Son H (2017) Associations between health literacy, cancer-related knowledge, and preventive health behaviors in community-dwelling Korean adults. J Health Commun 22(1):999–1006
34. Huang CH, Lo YJ, Kuo KM, Lu IC, Wu H, Hsieh MT (2021) Health literacy and cancer screening behaviors among community-dwelling female adults in Taiwan. Womens Health Issues 61(1):408–419

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.